

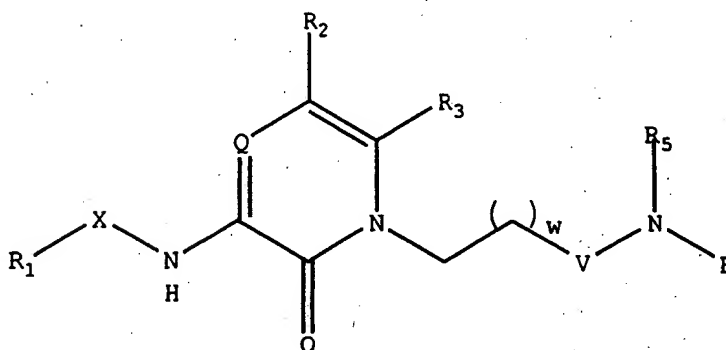


018813-0272492

Patent

CLAIMS MARKED UP TO SHOW CHANGES

1. (Twice Amended) A compound of the formula:



(a) X is selected from the group consisting of $-S(O_2)-$, $-N(R')-S(O)_2$, $S(O)_2-N(R')-$, $-C(=O)-$, $-OC(=O)-$, $-NHC(=O)-$, $-C(=O)N(R')-$, $-P(O)(R')-$ and a direct link, wherein R' is independently hydrogen, alkyl of 1 to 4 carbon atoms, aryl of 6 to 14 carbon atoms, aralkyl of 7 to 16 carbon atoms, with the proviso that when X is $-P(O)(R')-$, the R' is not hydrogen;

(b) R_1 is selected from the group consisting of:

(1) alkyl of 1 to 12 carbon atoms which is optionally substituted with Y_1 and/or Y_2 ,

(2) alkyl of 1 to 6 carbon atoms substituted with cycloalkyl of 3 to 8 carbon atoms which is optionally mono-, di-, or tri-substituted with Y_1 , Y_2 and/or Y_3 ,

(3) cycloalkyl of 3 to 15 carbon atoms, which is optionally mono-, di-, or tri-substituted on the ring with Y_1 , Y_2 and/or Y_3 ,

(4) heterocycloalkyl of 4 to 10 ring atoms with the ring atoms selected from carbon and heteroatoms, wherein the heteroatoms are selected from the group consisting of oxygen, nitrogen, and $S(O)_i$, wherein i is 0, 1 or 2, which is optionally mono-, di-, or tri-substituted on the ring with Y_1 , Y_2 and/or Y_3 ,

(5) heterocyclo of 4 to 10 ring atoms with the ring atoms selected from carbon and heteroatoms, wherein the heteroatoms are selected from the group consisting of oxygen, nitrogen, and S(O)_i, which is optionally mono-, di-, or tri-substituted on the ring carbons with Y₁, Y₂ and/or Y₃,

(6) alkenyl of 2 to 6 carbon atoms which is optionally substituted with cycloalkyl of 3 to 8 carbon atoms, which is optionally mono-, di-, or tri-substituted on the ring carbons with Y₁, Y₂ and/or Y₃,

(7) aryl of 6 to 14 carbon atoms which is optionally mono-, di- or tri-substituted with Y₁, Y₂ and/or Y₃,

(8) heteroaryl of 5 to 14 ring atoms with the ring atoms selected from carbon and heteroatoms, wherein the heteroatoms are selected from oxygen, nitrogen, and sulfur, and which is optionally mono-, di-, or tri-substituted with Y₁, Y₂ and/or Y₃,

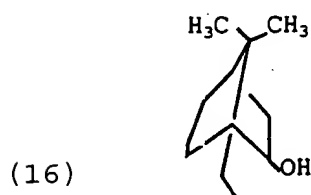
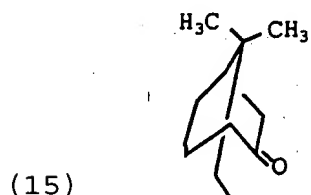
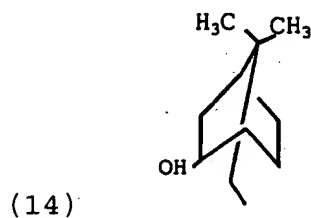
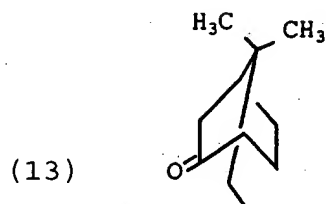
(9) aralkyl of 7 to 15 carbon atoms which is optionally substituted on the alkyl chain with hydroxy or halogen and which is optionally mono-, di-, or tri-substituted in the aryl ring with Y₁, Y₂ and/or Y₃,

(10) heteroaralkyl of 5 to 14 ring atoms with the ring atoms selected from carbon and heteroatoms, wherein the heteroatoms are selected from oxygen, nitrogen, and sulfur, and which is optionally substituted on the alkyl chain with hydroxy or halogen and which is optionally mono-, di- or tri-substituted on the ring with Y₁, Y₂ and/or Y₃,

(11) aralkenyl of 8 to 16 carbon atoms which is optionally mono-, di-, or tri-substituted on the aryl ring with Y₁, Y₂ and/or Y₃,

(12) heteroaralkenyl of 5 to 14 ring atoms with the ring atoms selected from carbon and heteroatoms, wherein the

heteroatoms are selected from oxygen, nitrogen, and sulfur, and which is optionally mono-, di- or tri-substituted on the ring with Y_1 , Y_2 and/or Y_3 ,



(17) fused carbocyclic alkyl of 5 to 15 carbon atoms,

(18) difluoromethyl or perfluoroalkyl of 1 to 12 carbon atoms,

(19) perfluoroaryl of 6 to 14 carbon atoms,

(20) perfluoralkyl of 7 to 15 carbon atoms, and

(21) hydrogen when X is a direct link;

wherein

(i) each Y_1 , Y_2 and Y_3 is independently selected from the group consisting of halogen, cyano, nitro, tetrazolyl optionally substituted with alkyl of 1 to 6 carbon atoms, guanidino, amidino, methylamino, methylguanidino, $-\text{CF}_3$, $-\text{CF}_2\text{CF}_3$, $-\text{CH}(\text{CF}_3)_2$, $-\text{C}(\text{OH})(\text{CF}_3)_2$, $-\text{OCF}_3$, $-\text{OCF}_2\text{CF}_3$, $-\text{OCF}_2\text{H}$, $-\text{OC}(\text{O})\text{NH}_2$, $-\text{OC}(\text{O})\text{NHZ}_1$, $-\text{OC}(\text{O})\text{NZ}_1\text{Z}_2$, $-\text{NHC}(\text{O})\text{Z}_1$, $-\text{NHC}(\text{O})\text{NH}_2$, $-\text{NHC}(\text{O})\text{NHZ}_1$, $-\text{NHC}(\text{O})\text{NZ}_1\text{Z}_2$, $-\text{C}(\text{O})\text{OH}$, $-\text{C}(\text{O})\text{OZ}_1$, $-\text{C}(\text{O})\text{NH}_2$, $-\text{C}(\text{O})\text{NHZ}_1$, $-\text{C}(\text{O})\text{NZ}_1\text{Z}_2$, $-\text{P}(\text{O})_3\text{H}_2$, $-\text{P}(\text{O})_3(\text{Z}_1)_2$, $-\text{S}(\text{O})_3\text{H}$, $-\text{S}(\text{O})_p\text{Z}_1$, $-\text{Z}_1$, $-\text{OZ}_1$, $-\text{OH}$, $-\text{NH}_2$, $-\text{NHZ}_1$, $-\text{NZ}_1\text{Z}_2$, N-morpholino, and $-\text{S}(\text{O})_p(\text{CF}_2)_q\text{CF}_3$, wherein p is 0, 1 or 2, q is an integer from 0 to 5, and Z_1 and Z_2 are independently selected from the group consisting of alkyl of 1 to 12 carbon atoms, aryl of 6 to 14 carbon atoms, heteroaryl of 5 to 14 atoms having 1 to 9 carbon atoms, aralkyl of 7 to 15 carbon atoms, and heteroaralkyl of 5 to 14 ring atoms, or

(ii) Y_1 and Y_2 are selected together to be $-\text{O}[\text{C}(\text{Z}_3)(\text{Z}_4)]_r\text{O}-$ or $-\text{O}[\text{C}(\text{Z}_3)(\text{Z}_4)]_{r+1}-$, wherein r is an integer from 1 to 4 and Z_3 and Z_4 are independently selected from the group consisting of hydrogen, alkyl or 1 to 12 carbon atoms, aryl of 6 to 14 carbon atoms, heteroaryl of 5 to 14 ring atoms having 1 to 9 carbon atoms, aralkyl of 7 to 15 carbon atoms, and heteroaralkyl of 5 to 14 ring atoms;

(c) Q is $-\text{C}(\text{R}_4)-$;

(d) R_2 is selected from the group consisting of hydrogen, halogen and alkyl of 1 to 6 carbon atoms;

(e) R_3 is selected from the group consisting of hydrogen, alkyl 1 to 6 carbon atoms, cycloalkyl of 3 to 7 carbon atoms, alkoxy of 1 to 6 carbon atoms, halogen, and trifluoromethyl;

(f) alternatively, R_2 and R_3 are selected together and are $-(CH_2)_k-$ where k is 3 or 4;

(g) R_4 is selected from the group consisting of hydrogen, alkyl of 1 to 8 carbon atoms, hydroxy, alkoxy of 1 to 8 carbon atoms, aralkyl of 7 to 15 carbon atoms, alkyl of 1 to 5 carbon atoms substituted with cycloalkyl of 3 to 8 carbon atoms, $-NHR_8$, $-S(O)_tR_8$ and $-C(=O)R_8$ where t is 0, 1 or 2;

(h) w is 0, 1 or 2;

(i) V is $-CH(R_9)-$, $-C(=O)-$, $-O-$, $-S(O)_2-$ or a direct link];

(j) R_5 is hydrogen or alkyl of 1 to 6 carbon atoms;

(k) E is heteroaryl of 6 to 10 ring atoms having from 1 to 4 ring nitrogen atoms and the remainder of the ring atoms carbon atoms and which is substituted with R_6 and R_7 ;

(l) R_6 and R_7 are independently selected from the group consisting of hydrogen, halogen, hydroxy, alkyl of 1 to 6 carbon atoms, alkoxy of 1 to 6 carbon atoms, alkyl of 1 to 4 carbon atoms substituted with alkoxy of 1 to 4 carbon atoms, trifluoromethyl, $-C(=O)OR_{10}$, $-NHR_{10}$, $-C(=O)R_{10}$, $-C(=O)NHR_{10}$, $-OC(=O)NHR_{10}$, $-C(=NR_{10})NHR_{11}$, and $-N(R_{12})-C(=NR_{10})NHR_{11}$; and

(m) R_8 , R_9 , R_{10} , R_{11} and R_{12} are independently selected from the group consisting of hydrogen, alkyl of 1 to 6 carbon atoms and $-(CF_2)_jCF_3$ wherein j is 0, 1, 2 or 3; or pharmaceutically acceptable salts thereof.

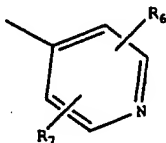
[2. A compound according to claim 1 wherein V is $-CH(R_9)-$.]

3. (Amended) A compound according to claim [2] 1 wherein R_9 is hydrogen.

4. A compound according to claim 3 wherein X is $-S(O)_2-$ or a direct link.

5. A compound according to claim 4 wherein R_1 is substituted or unsubstituted aralkyl.

6. A compound according to claim 5 wherein E is



7. A compound according to claim 6 wherein R_6 and R_7 are independently hydrogen or halogen.

8. A compound according to claim 7 wherein at least one of R_6 and R_7 is hydrogen.

10. (Amended) A compound according to claim 8 wherein w is 1.

11. (Amended) A compound according to claim 8 wherein R_4 is hydrogen.

12. A compound according to claim 11 wherein w is 1.

14. (Twice Amended) A compound according to claim [2] 1 wherein X is $-S(O)_2-$.

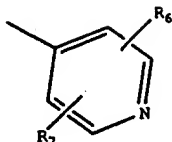
15. A compound according to claim 14 wherein R_9 is hydrogen or methyl.

18. (Amended) A compound according to claim 15 wherein R_1 is substituted or unsubstituted aralkyl.

19. A compound according to claim 18 wherein R_9 is hydrogen.

20. A compound according to claim 19 wherein w is 0 or 1.

21. A compound according to claim 1 wherein E is



22. A compound according to claim 21 wherein R_6 and R_7 are independently hydrogen or halogen.

23. A compound according to claim 22 wherein at least one of R_6 and R_7 is hydrogen.

[24. A compound according to claim 21 wherein V is $-C(R_9)-$.]

25. (Amended) A compound according to claim [24] 23 wherein R_9 is hydrogen or methyl.

26. (Amended) A compound according to claim [2] 1 wherein X is $-S(O_2)-$ or a direct link.

27. A compound according to claim 26 wherein R_1 is unsubstituted aralkyl, substituted aralkyl or alkyl substituted with cycloalkyl in which the cycloalkyl group is substituted with aryl or heteroaryl.

28. A compound according to claim 27 wherein R_2 is hydrogen and R_3 is hydrogen or methyl.

29. A compound according to claim 28 wherein R_3 is methyl.

33. (Amended) A compound according to claim 1 selected from the group consisting of Compounds A, E, F, G, H, I, J, K, L, M, N, P, Q and R depicted in Figures 1A and 1B.

34. A pharmaceutical composition for treating or decreasing the incidence of a condition in a mammal characterized by abnormal thrombosis, comprising a therapeutically acceptable carrier, and a therapeutically effective amount of compound of claim 1.

35. (Amended) A pharmaceutical composition for treating or decreasing the incidence of a condition in a mammal characterized by abnormal thrombosis, comprising a therapeutically acceptable carrier, and a therapeutically effective amount of compound of claim [2] 3.

36. A pharmaceutical composition for treating or decreasing the incidence of a condition in a mammal characterized by abnormal thrombosis, comprising a therapeutically acceptable carrier, and a therapeutically effective amount of compound of claim 6.

37. A pharmaceutical composition for treating or decreasing the incidence of a condition in a mammal characterized by abnormal thrombosis, comprising a therapeutically acceptable carrier, and a therapeutically effective amount of compound of claim 15.

38. A pharmaceutical composition for treating or decreasing the incidence of a condition in a mammal characterized by abnormal thrombosis, comprising a therapeutically acceptable carrier, and a therapeutically effective amount of compound of claim 19.

39. (Amended) A pharmaceutical composition for treating or decreasing the incidence of a condition in a mammal characterized by abnormal thrombosis, comprising a therapeutically acceptable carrier, and a therapeutically effective amount of compound of claim 53.

40. (Amended) A pharmaceutical composition for treating or decreasing the incidence of a condition in a mammal characterized by abnormal thrombosis, comprising a therapeutically acceptable carrier, and a therapeutically effective amount of compound of claim 55.

41. A pharmaceutical composition for treating or decreasing the incidence of a condition in a mammal characterized by abnormal thrombosis, comprising a therapeutically acceptable carrier, and a therapeutically effective amount of compound of claim 33.

42. A method for treating or decreasing the incidence of a condition in a mammal characterized by abnormal thrombosis, comprising administering to said mammal a therapeutically effective amount of the compound of claim 1.

43. (Amended) A method for treating or decreasing the incidence of a condition in a mammal characterized by abnormal thrombosis, comprising administering to said mammal a therapeutically effective amount of the compound of claim [2] 3.

44. A method for treating or decreasing the incidence of a condition in a mammal characterized by abnormal thrombosis, comprising administering to said mammal a therapeutically effective amount of the compound of claim 6.

45. A method for treating or decreasing the incidence of a condition in a mammal characterized by abnormal thrombosis, comprising administering to said mammal a therapeutically effective amount of the compound of claim 15.

46. A method for treating or decreasing the incidence of a condition in a mammal characterized by abnormal thrombosis, comprising administering to said mammal a therapeutically effective amount of the compound of claim 19.

47. (Amended) A method for treating or decreasing the incidence of a condition in a mammal characterized by abnormal thrombosis, comprising administering to said mammal a therapeutically effective amount of the compound of claim 53.

48. (Amended) A method for treating or decreasing the incidence of a condition in a mammal characterized by abnormal thrombosis, comprising administering to said mammal a therapeutically effective amount of the compound of claim 55.

49. A method for treating or decreasing the incidence of a condition in a mammal characterized by abnormal thrombosis, comprising administering to said mammal a therapeutically effective amount of the compound of claim 33.

50. A compound according to claim 15 wherein R_4 is hydrogen.

51. A compound according to claim 50 wherein R_2 is hydrogen.

52. A compound according to claim 51 wherein R_3 is methyl.

53. A compound according to claim 29 wherein R_4 is hydrogen.

54. A compound according to claim 1 wherein R_4 is hydrogen.

55. A compound according to claim 54 wherein R_2 is hydrogen.

56. A compound according to claim 55 wherein R_3 is methyl.

57. (New) A pharmaceutical composition comprising a pharmaceutically acceptable carrier and a therapeutically effective amount of a compound of any of claims 1, 3, 6, 15, 19, 33, 53 or 55.

58. (New) A method of preventing or treating in a mammal a condition of abnormal thrombus formation which comprises administering to said mammal a therapeutically effective amount of a compound of any of claims 1, 3, 6, 15, 19, 33, 53 or 55.